

24(6), 24(2), 18(7)

SOV/126-7-2-10/39

AUTHORS: Borovskiy, I. B. and Gurov, K. P.

TITLE: Investigation of the Electron Spectra of Dilute Solid Solutions (Issledovaniye elektronnoy spektra razbavlennykh tverdykh rastvorov)

PERIODICAL: Fizika Metallov i Metallovedeniye, 1959, Vol 7, Nr 2, pp 225-234 (USSR)

ABSTRACT: The present paper describes certain conclusions on the electron energy spectra of dilute solid solutions deduced from the fine structure of X-ray spectra of atoms of the alloy base, studied as a function of concentration of the impurity and as a function of temperature. X-ray emission spectra were obtained by means of a bent-crystal spectrograph. The K_{α_1} , K_{β_1} , K_{β_2} emission lines of chromium and the K_{β_2} , K_{B_1} and L_{β_2} emission lines of molybdenum were recorded. The authors obtained also the K and the L_{III} absorption spectra of chromium and molybdenum. All these spectra were obtained using pure metallic chromium (99.5-99.98% purity) and alloys of chromium containing 0.1, 0.7 and

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1% of Mo. The main results of the X-ray spectral measurements are given in Tables 1 and 2 and in Fig 1. Using these results, the authors suggested a new model of a dilute solid solution. To check the correctness of this model the authors studied the effect of concentration of impurities and of temperature on the mobility of atoms in α -type solid solutions with body-centred cubic lattice. For this purpose the L_{III} absorption spectra of lead in Pb-Sn alloys were obtained between -190 and +300°C. These L_{III} absorption spectra were obtained for pure lead and lead alloys containing 0.2, 0.5, 2.0 and 10% of Sn; a bent-crystal spectrograph was used and transmission patterns were obtained. The X-ray absorption spectra of lead are shown in Fig 3 and the wavelengths of the maxima near the L_{III} -edge are listed in Table 3. The authors draw the following conclusions from their experimental data:
1) A small amount of impurity alters the whole electron spectrum of the alloy, if the base of the alloy is a

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transition element or an element with virtually unfilled inner electron levels.

2) The energy distribution of the outer (valence)

electron levels and of some inner electron levels is altered on formation of interatomic bonds in alloys.

3) Molybdenum, as an impurity, is negatively charged.

4) Thermal vibrations affect not only the processes of scattering of electrons but also the whole electron energy spectrum and the charge of the base-metal atoms.

5) Presence of small impurities alters the mobility of the base-metal atoms and at a certain impurity concentration the mobility of atoms of transition elements passes through a minimum; the temperature dependence of mobility depends on the sign of the excess charge of the impurity atoms.

These conclusions and the analysis of published material (Refs 5,6) were used as the basis of a model which describes formation of "atomic blocks" in dilute solid solutions. An impurity, when introduced into a metal, loses its outer electrons to the conduction band of the base-metal and consequently acquires a charge which, in

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general, is different from the charge of the base-metal atoms. The impurity charge may be regarded as a perturbation producing a deformation of the electron energy bands of the base-metal. This causes a spatial re-distribution of electrons in incompletely filled bands and alters somewhat the effective charge of the base metal atoms. The latter effect may be regarded as an appearance of induced impurities whose charges are opposite in sign to the impurity charge. An additional coupling appears between the original and induced impurities: stable blocks of short-range order are formed. Such blocks exist until a complete overlapping of the spheres of action of the perturbing potentials due to impurities occurs, i.e. there is an upper limit of impurity concentration above which such blocks are no longer formed. There are 5 figures, 3 tables and 11 references, 6 of which are Soviet, 4 English and 1 German.

ASSOCIATION: Institut metallurgii imeni A. A. Baykova.
(Institute of Metallurgy imeni A. A. Baykov)

SUBMITTED: August 21, 1957

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24 (7), 18 (7)

AUTHORS:

TITLE:

PERIODICAL

ABSTRACT:

Borovskiy, I. B., Gurov, K. P.

On the Evaluation of the Influence of Impurities on the X-ray Emission Spectrum of Diluted Solid Solutions on the Basis of Transition Metals (Ob otsenke vliyaniya primesey na rentgenovskiy ~~emissionnyy~~ spektry razbavlenykh tverdykh rastvorov na osnove perekhodnykh metallov)

Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, 1959, Vol 23, Nr 5, pp 660 - 665 (USSR)

A model is introduced by the authors of the present paper, according to which the impurities in the metal exhibit a positive and a negative charge. This disturbing potential causes a deformation of the electron shell of the basic metal atoms. In transition metals this effect causes defective d- or f-shells. The electron flowing over is explained with Fermi levels and a model is thus developed concerning the local deformation of the electron spectrum of the system. Concerning the theoretical basis of this model reference is made to paper (Ref 3). The principal results obtained from the investigation under review are then summarized. The single-electron energy spectrum and the interaction of an ideal crystal are first developed. The

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formulas thus obtained are developed for the case of local potential disturbances. Formula (7) is developed in this connection for the displacement of the electron energy level. On the strength of these formulas the influence exerted by impurities on the X-ray spectrum of α iron is then evaluated. An evaluation then follows of the mean induced charge upon an atom shell of the basic metal, and next, the mean change of an atom charge is developed in general and for iron. The formula is given for the effective radius of the charge. The empirical method of evaluation is then dealt with and some values concerning α iron are given. Finally, the relationship with the Moseley law is mentioned and some formulas are derived. There are 17 references, 8 of which are Soviet.

ASSOCIATION: Institut metallurgii Akademii nauk SSSR (Institute of Metallurgy of the Academy of Sciences, USSR)

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24 (4)

AUTHORS:

Borovskiy, I. B., Gurov, K. P.

SOV/56-36-4-35/70

TITLE:

On the Influence of Impurities on the X-Ray Spectra of Transition Metals (Ovliyanii primesey na rentgenovskiy spektry perekhodnykh metallov)

PERIODICAL:

Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959, Vol 36, Nr 4, pp 1203-1206 (USSR)

ABSTRACT:

As investigations carried out in recent years of solid solutions on transition metals showed, impurities in low concentrations (0.01 - 0.1 atom%) exercise a considerable influence on certain physical properties of such solutions (as e. g. modification of the parameters of emission and absorption X-ray spectra, variation of the optical constant, of the self-diffusion coefficients, of the linear coefficient of expansion, etc). Already in previous papers (Refs 1, 2) the authors investigated similarity models of the physical mechanism of the effect produced by such impurities upon the electron energy spectra and the interatomic binding forces in these metals. They carried out their investigations on the basis of empirical and theoretical results. In the present paper the applicability of the representations developed for

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On the Influence of Impurities on the X-Ray Spectra of Transition Metals SOV/56-36-4-35/70

a qualitative estimation of the wave length variation of the lines in X-ray emission spectra is investigated. The model representations are discussed in the introduction. On the basis of these representations and of that of Moseley's law, the influence of impurities is estimated. For the purpose of illustrating the method, the linear shift in the emission X-ray spectrum of iron in solid and diluted solutions (α -phase) is investigated and compared with the spectrum of pure α -iron. For an impurity concentration of 0.1 atom%

$|\Delta Z_e| \approx 10^{-2} |Z_e|$ holds for the variation of the effective charge. By means of Moseley's law the shifting of lines is investigated; it holds that $\Delta \nu / \nu = -2\Delta\sigma / (Z_{nuc} - \sigma)$ (Z_{nuc} = absolute nuclear charge, σ = shielding constant). For $\Delta\sigma$ it holds that $\Delta\sigma = B_{3d} \Delta z_{3d}$ (z_{3d} = charge of the 3d-electron shell); according to the Sommerfeld formula $B_{3d} = a_n / a$ (a_n = radius of that electron shell to which the s corresponds, a = atomic radius). For the shifting of the K_{β_1} - line (1s - 3p transition) one obtains with $a_{3p} = 0.2 \cdot 10^{-8}$ cm and

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$$a = 0.4 \cdot 10^{-8} \text{ cm } B_{3d} \approx 10^{-1} ; |\Delta \sigma| = B_{3d} |\Delta Z_{3d}| \approx 10^{-3}$$

$$\text{and with } (Z_{nuc} - \sigma) \approx 20 : |\Delta \nu / \nu| = |-2 \Delta \sigma / (Z_{nuc} - \sigma)| \approx 10^{-4}.$$

Experimental data give $\Delta \nu \approx 0.7 \text{ ev}$ at $\nu = 7 \cdot 10^3 \text{ ev}$, i. e.
the same order of magnitude. There are 11 references, 8 of
which are Soviet.

ASSOCIATION: Institut metallurgii Akademii nauk SSSR (Metallurgy Institute
of the Academy of Sciences, USSR)

SUBMITTED: October 10, 1958

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24 (7)

AUTHOR:

Borovskiy, I. B.

SOV/53-68-1-7/17

TITLE:

X-ray Spectrum Analysis (Rentgenospektral'nyy analiz)

PERIODICAL:

Uspekhi fizicheskikh nauk, 1959, Vol 68, Nr 1, pp 81-91 (USSR)

ABSTRACT:

Beginning with the discovery of X-rays the author first gives a short historical survey and then describes, almost in the manner of a textbook, the formation of the X-ray spectrum with the help of numerous level- and line schemes of absorption- and emission spectra. The mode of operation and the design of an X-ray spectrograph is then described by means of a simple scheme. Further, the quantitative chemical X-ray spectrum analysis is discussed which is based on the assumption that the line intensity is proportional to the concentration of the corresponding atoms. The X-ray spectrum analysis is also discussed in connection with the fluorescence analysis; the latter is sensitive up to 10^{-2} %, its sensitivity depends, however, on the ordinal and attains a maximum value of 10^{-3} %. Further, the author gives a description of the so-called monitor method by means of schemes (Figs 5, 6). The scheme of a three-channel X-ray fluorescence spectrograph illustrates the mode of operation of multi-channel spectrographs.

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Figure 6 shows the principle underlying such a spectrograph which operates with one single monitor. In recent times a practice has been disseminated in the United States whereby the background intensity of the continuous spectrum or the total intensity of the continuous emission is employed. This method has in principle been known in the USSR already since fifteen years and is applied to photographic recording of spectra. The author describes then the methods of quantitative X-ray fluorescence analysis. This analysis takes from some minutes to 1-2 hours. Special importance is attached to the new method as it permits the chemical investigation of the microvolumes of a substance with the help of X-ray spectrum analysis. Figure 7 shows the scheme of such an apparatus. The author gives a short description of the preparation of sections and demonstrates the principle of the method. Figure 8 shows a photograph of such an apparatus, i.e. of the apparatus RSASh-2 (operational current 10^{-6} - 10^{-8} a, focus diameter $1 - 3\mu$, counting rate $10^3 - 10^5$ pulses/sec; determination of elements up to 0.01 - 0.5 %, magnification 400-1600). The

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apparatus permits the analysis of the chemical composition in a certain point of the section. The result of this quantitative analysis "in a certain point" is given in figure 9. There are 9 figures and 12 references, 3 of which are Soviet.

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24(7)

AUTHORS:

Borovskiy, I. B., Ditsman, S. A.

SOV/20-124-5-22/62

TITLE:

Local X-ray Spectroscopy (Lokal'naya rentgenovskaya spektroskopiya)

PERIODICAL:

Doklady Akademii nauk SSSR, 1959, Vol 124, Nr 5, pp 1042-1044 (USSR)

ABSTRACT:

With this method of investigating the chemical composition of a substance the characteristic X-ray radiation is excited by means of an electron probe of 2-5 μ diameter. The local sensitivity of this method amounts to 10^{-13} - 10^{-15} g and the temperature of the object under investigation is less than 40°. The present paper shows new possibilities for the investigation of the energy spectrum of the electrons of condensed systems by means of microfocus X-ray spectroscopy, where the fine structure of the emission lines is investigated. The basic scheme of the microfocus spectrograph is shown in form of a schematical drawing. In this spectrograph the Kapitsa-Iogan-method is used for focusing radiation. The microsource of X-ray radiation, which has a diameter of 5 μ , is on a Rowland circle. The low efficiency necessary for the microfocus X-ray tube (some watts) simplifies the problems of stabilization

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and recording the intensity of X-ray radiation considerably. For every fixed position of the microfocus radiation source with respect to the curved crystal a strictly monochromatic bundle of rays is reflected. In the second diagram the widths and shapes of the lines of the X-ray spectrum, which were determined by means of a microfocus spectrograph and by means of the usual apparatus with conditions otherwise being equal, were compared with one another. This then shows full agreement of these parameters. Other figures by way of examples show the lines $K\alpha_1\alpha_2$ and $K\beta_1$ of iron in the θ -phase of the alloys Fe-Zn ($\sim 6\%$ Fe), which were determined in the contact-diffusion layer of the original metals (annealing for 4 hours at 290°). A comparison of the parameters of the lines in the θ -phase and in the original Fe shows a decrease of the asymmetry index K to 1.3. The use of a microfocus X-ray spectrograph makes it possible to carry out a renewed methodical investigation of the fine structure of X-ray emission spectra of the phase diagrams of binary and complicated metallic systems by using the diffusion layer at the places

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of contact between two metals, a metal and an alloy, etc.
There are 3 figures and 3 Soviet references.

ASSOCIATION: Institut metallurgii im. A. A. Baykova Akademii nauk SSSR
(Institute of Metallurgy imeni A. A. Baykov of the Academy
of Sciences, USSR)

PRESENTED: November 3, 1958, by S. A. Vekshinskiy, Academician

SUBMITTED: November 2, 1958

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5(4)

AUTHORS:

Borovskiy, I. B., Marchukova, I. D.

SOV/20-125-4-41/74

TITLE:

A Method of Determining the Phase State of Binary Systems
(Metod opredeleniya fazovogo sostoyaniya dvoynykh sistem)

PERIODICAL:

Doklady Akademii nauk SSSR, 1959, Vol 125, Nr 4, pp 835-837
(USSR)

ABSTRACT:

Reference is first made to several earlier papers dealing with this subject. The method mentioned in the title is characterized by the fact that in a special X-ray tube ground section of the alloy to be investigated is substituted for the anode. The electron beam accelerated up to from 30,000 to 40,000 v is focused to a narrow probe by a system of electromagnetic lenses, the diameter of which on the surface of the ground section amounts to 0.1 to 2 μ . On this surface the electrons of the probe excite the characteristic X-ray radiation of the atoms of the substance. This radiation is then decomposed into a spectrum by means of a curved crystal and is fixed by means of a quantum counter. Determination of the wave lengths of the characteristic X-ray radiation makes it possible to determine the qualitative composition of the alloy. By comparing the line intensities of the element in the samples and in "standard"

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it is possible to determine the quantitative fraction of a given element in the sample under investigation. In the course of investigations of diffusion layers in various binary systems (Cu-Zn, Cu-Au, Mo-Be, Mo-Si, Al-Si, etc.) by means of this method it was found that, in the case of a suitable selection of the samples, all phases are formed in the diffusion layer that exist according to the state diagram of the given system. Besides, it was found that no regions of phase mixture exist in the diffusion layer. The limits of concentration of the phases do not correspond to the concentration limits of the phase diagram. This is connected with the specific conditions of phase stability in the diffusion layer. Therefore, the data determined in the course of investigations of diffusion layers can be used only for the construction of a skeleton-scheme of the phase diagram, and they do not give the exact boundaries between the individual phases. The authors suggest the following method of constructing the phase diagram: For a binary system a diffusion layer is produced by means of a contact method, from which, also by the contact method, the number of phases in the system at annealing temperature and their "con-

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centration expansion" is determined. Next, samples are produced which have a composition that corresponds to the regions of the phase mixture with respect to concentration. These samples are then annealed at different temperatures, and determination of their phase composition renders it possible to determine the temperature dependence of the concentration limits of the determined phases. The domains corresponding to the phase mixture are determined directly from the concentration curves of the diffusion layers. This method was checked in connection with the classical mixtures copper-zinc and copper-gold. In this respect the Cu-Au system is especially interesting. The system may be used also if in the system there are "phases of an ordered state". There are 4 figures, 1 table, and 7 references, 5 of which are Soviet.

ASSOCIATION: Institut metallurgii im. A. A. Baykova Akademii nauk SSSR
(Institute of Metallurgy imeni A. A. Baykov of the Academy of Sciences, USSR)

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24(4)

SOV/20-127-5-17/58

AUTHORS:

Borovskiy, I. B., Shmidt, V. V.

TITLE:

The Investigation of the Temperature Dependence of the Fine Structure of the X-Ray Main K-Edge in the Fe-Absorption Spectrum

PERIODICAL:

Doklady Akademii nauk SSSR, 1959, Vol 127, Nr 5, pp 997-1000 (USSR)

ABSTRACT:

The investigation was carried out by means of a double crystal spectrometer with calcite crystals. Iron foils with a thickness of about 7μ were used as adsorbent. They were heated in a high vacuum by the passage of an electric current. The high vacuum prevented oxidation, which was confirmed both by the appearance of the foils after many hours of heating to 950° and by the unchanged electric resistance. Figure 1 shows the experimentally recorded spectra of the K-band at various temperatures. In an earlier paper (Ref 1) it was found that the spectrum deviations have dispersion form. By means of the method described in reference 2 it was possible to correct the spectrum (Fig 2). The initial range ABC (cf Fig 2) was varied neither during passage through Curie point nor by the $\alpha \rightarrow \beta$ -transition. The selective peak B of absorption, which may be observed in the

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The Investigation of the Temperature Dependence of the Fine Structure of the X-Ray Main K-Edge in the Fe-Absorption Spectrum

case of all transition elements of the iron group, is explained by the transition of the electrons into the non-occupied part of the 3d-band. The authors now prove that the fine structure of the short-wave part and its temperature dependence may be brought into connection with the excitation of plasma oscillations of the electron gas in the metal, by which the real shape of the absorption edge is distorted. From references 6 and 7 it follows that in the case of X-ray quanta, the energy of which is near that of the absorption edge, an absorption of the X-ray quantum accompanied by a simultaneous excitation of the plasma is probable. In reference 7 a distance of 7 ev from the line is given as the first maximum. The authors look upon this maximum as excitation of the plasma and conclude that the real absorption edge is superimposed by the plasma image of the initial section ABCD. The real K-edge for the α -iron is then drawn (Fig 3) and in a similar manner also the K-edge for β -iron is determined in which the plasma image is shifted by 11 ev, which was proved by means of electrostatic measurements. Thus, the primary characteristic energy loss of the electrons

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The Investigation of the Temperature Dependence of the Fine Structure of the
X-Ray Main K-Edge in the Fe-Absorption Spectrum

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between 20-800° does not depend on temperature and amounts to 7.5±0.7 ev, whereas at temperatures above the $\alpha \rightarrow \beta$ transition a jump occurs to 11.0±0.7 ev. The frequency of the plasma oscillations thus depends on the structure of the crystal lattice. There are 4 figures and 8 references, 5 of which are Soviet.

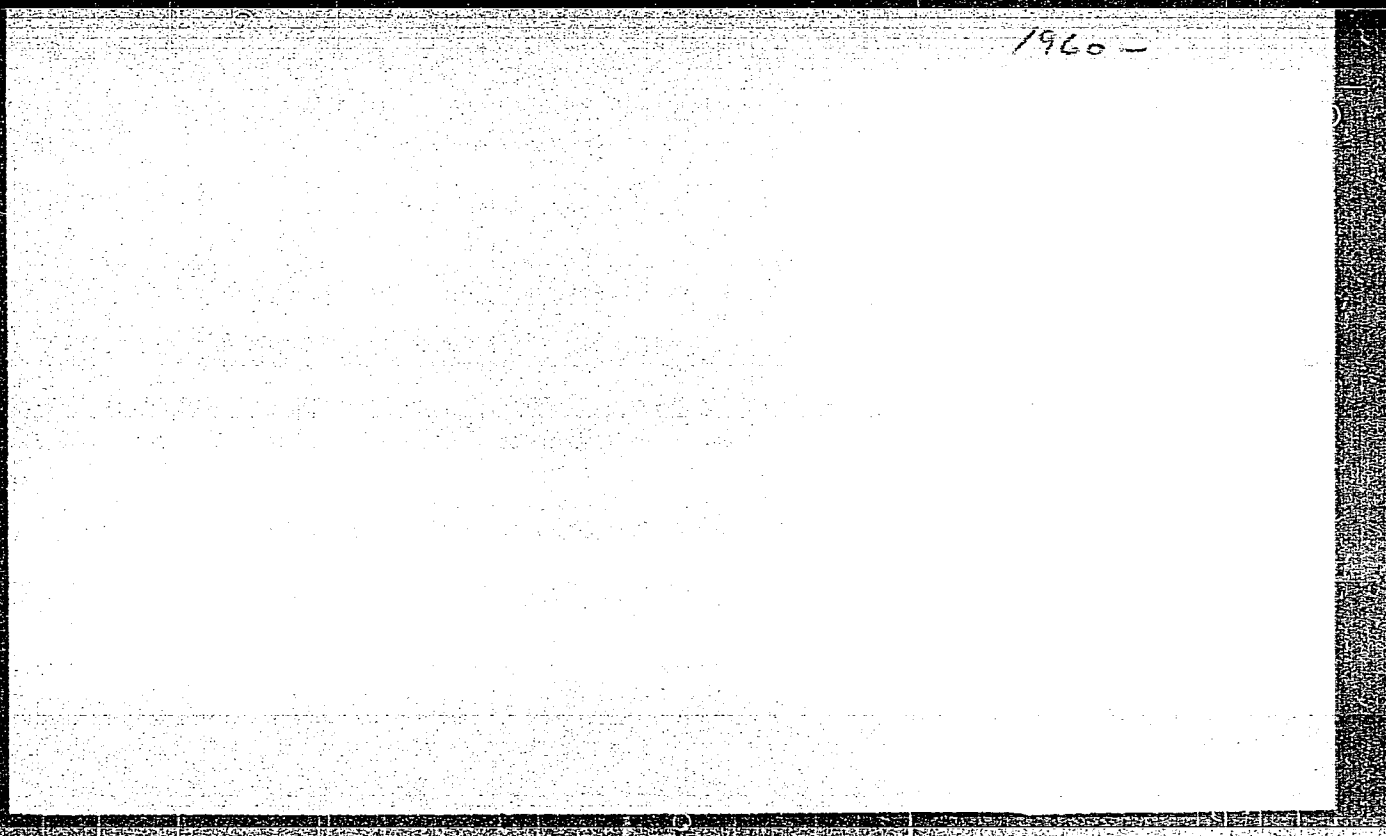
ASSOCIATION: Institut metallurgii im. A. A. Baykova Akademii nauk SSSR
(Institute of Metallurgy imeni A. A. Baykov of the Academy of Sciences, USSR)

PRESENTED: April 27, 1959 by G. V. Kurdyumov, Academician

SUBMITTED: April 22, 1959

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WILL FILL THEM UPON REQUEST.



BOROVSKIY, I.B.

PHASE I BOOK EXPLOITATION

SOV/4557

Akademiya nauk SSSR. Institut metallurgii

Metallurgiya, metallovedeniye, fiziko-khimicheskiye metody issledovaniya
(Physicochemical Research Methods in Metallurgy and Metal Science) Moscow,
Izd-vo AN SSSR, 1960. 151 p. (Series: Its: Trudy, vyp. 6) 3,000 copies
printed.

Sponsoring Agency: Akademiya nauk SSSR. Institut metallurgii imeni A.A. Baykova.

General Ed.: I.P. Bardin, Academician (Deceased); Resp. Eds. for this Vol.:
I.B. Borovskiy, Doctor of Physics and Mathematics, and K.P. Gurov, Candidate
of Physics and Mathematics; Ed. of Publishing House: K.P. Gurov, Candidate of
Physics and Mathematics; Tech. Ed.: O.M. Gus'kova.

PURPOSE: This collection of articles is intended for researchers in metallurgy
and metal science and for scientists engaged in developing physicochemical
methods of analysis.

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Physicochemical Research Methods (Cont.)

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COVERAGE: The collection contains 21 studies by members of the Laboratoriya fizicheskikh metodov issledovaniya (Laboratory of Physical Analysis Methods) of the Institut metallurgii imeni A.A. Baykova AN SSSR (Metallurgical Institute imeni A.A. Baykov, Academy of Sciences USSR), published in 1958-59. The articles are concerned with the experimental and theoretical study of physical characteristics of diluted solid solutions and compounds with special properties. The purpose of these studies is to establish the interrelation between the electronic structure of atoms and the structural characteristics of metallic compounds of systems. Some of the articles contain results obtained by applying new physical analysis methods, including the x-ray spectrum method (for analyzing the composition of microvolumes of alloys) and the microfocused x-ray spectroscopic method. Other articles describe the new RSASh-2 and RSASh-ZD apparatus used in the analysis. The first article, by I.B. Borovskiy, deals with the accomplishments and trends of Soviet research in metal science and metallurgy. References accompany each article. Also included is a bibliography containing 383 works by members of the Metallurgical Institute imeni A.A. Baykov. This bibliography was first published in 1956.

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Physicochemical Research Methods (Cont.)

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Physicochemical Research Methods (Cont.)

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2209, 1138, 1136 only

AUTHORS: Gurov, K.P. and Borovskiy, I.B.

TITLE: A Theory of Dilute Solid Solutions

PERIODICAL: Fizika metallov i metallovedeniye, 1960, Vol.10, No.4,
pp.513-519

TEXT: The curves showing a physical property plotted against the amount of a second component (impurity) in an alloy have marked extrema in dilute alloys of transition metals or metals with unfilled inner electron shells. Such extrema were observed for the self-diffusion coefficient (Ref.1), the linear thermal expansion coefficient (Ref.2), Young's modulus and internal-friction characteristics (Ref.3), the rate of disappearance of the fine structure in the X-ray absorption spectra with increase of temperature (Ref.4), the electrical conductivity (Ref.5), the optical constants (Ref.6) and other properties. The present paper extends authors' earlier work (Ref.7) on dilute alloys. Their proposed theory is based on the following considerations. An impurity introduced into a metal loses its outer (valence) electrons which join the conduction electrons of the matrix. Impurity ions formed in this way have perturbing potentials with a finite radius

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of action (amounting to several coordination spheres) because of the screening effect of the conduction electrons. Polarization produced by the impurity ions deforms electron shells of the matrix atom cores. Near an impurity the effective charges of the matrix atom cores are altered. This can be regarded as appearance of excess charges which are opposite in sign to the charges of the impurity ions. Consequently, an additional polar binding appears between impurities and matrix atoms, leading to formation of atomic "blocks" with stronger binding. This theory is shown to explain the following properties of α -Fe-W solid solutions:

- a) a maximum on the concentration dependence of Young's modulus at 0.06 at% W (Fig.1);
- b) a maximum on the temperature dependence of the internal-friction coefficient at various concentrations of W (Fig.2);
- c) an electrical resistivity minimum on the concentration dependence (Fig.3);
- d) a minimum on the concentration dependence of the effective number of electrons (Fig.4).

There are 4 figures.

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A Theory of Dilute Solid Solutions

ASSOCIATION: Institut metallurgii im. A.A.Baykova AN SSSR
(Metallurgy Institute imeni A.A.Baykov. AS USSR)

SUBMITTED: February 6, 1960

X

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S/022/60/013/01/07/010

C 111/ C 333

AUTHOR: Bezirganyan, P. A., Borovskiy, I. B.

TITLE: The Dependence of the Intensity of Reflected Roentgen Waves on the Magnitude of the Reflecting Monocrystal ¹

PERIODICAL: Izvestiya Akademii nauk Armyanskoy SSR. Seriya fiziko-matematicheskikh nauk, 1960, Vol. 13, No. 1, pp. 121-140

TEXT: A detailed investigation of existing theories leads the authors to the following statements: The kinematic theory of interference of X rays due to Laue is applicable only for crystals, the dimensions of which are smaller than the first Fresnel zone. The dynamic theory of Darwin is only valid for crystals, the dimensions of which are much greater than the first Fresnel zone. The correction of Darwin of the primary extinction takes into account only the dependence of the intensity of reflected waves on the thickness of the crystal, and therefore it is inexact for crystals the reflecting surfaces of which are smaller than 10^{-2} cm. The decrease of the intensity of reflected X rays with increase of the reflecting surfaces can also be partially explained by the kinematic theory. In the dynamic theory of Darwin the coefficient

✓B

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The Dependence of the Intensity of Reflected Roentgen Waves on the
Magnitude of the Reflecting Monocrystal

of refraction for crystals with dimensions $< 10^{-2}$ cm is given in-
exactly. By a correction the theory of Darwin can be made applicable
for crystals of arbitrary size. ✓B

There are 5 figures, and 10 references: 6 Soviet, 3 English and 1 German.

ASSOCIATION: Yerevanskiy gosudarstvennyy universitet; Institut
metallurgii imeni A. A. Baykova AN SSSR (Yerevan State
University; Institute of Metallurgy imeni A. A. Baykov
AS USSR)

SUBMITTED: May 8, 1959

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24.6300

AUTHORS: Ovsiannikova, I. A., Borovskiy, I. B.

TITLE: Investigation of the Fine Structure of the X-Ray K-Spectra ²¹
of Some Sulfides

PERIODICAL: Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, 1960,
Vol. 24, No. 4, pp. 435-440

TEXT: The present paper is a reproduction of a lecture delivered at the 4th All-Union Conference on X-Ray Spectroscopy (Rostov-na-Donu, June 29 - July 6, 1959). In the introduction, some properties of the sulfides CuS, NiS, CoS, and ZnS are discussed. CuS is diamagnetic, while NiS and CoS are paramagnetic. Their susceptibility is, however, considerably weaker than that of metal ions in solution. In 1932 Klemm has already assumed that these compounds are to be regarded as intermetallides and not as salts. Already earlier, X-ray spectroscopic investigations of CuS and NiS have been made, however, only the individual components or only absorption- or emission spectra have been investigated. The authors of the present paper studied the fine structure

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Investigation of the Fine Structure of
the X-Ray K-Spectra of Some Sulfides

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B006/B017

of the X-ray emission- and absorption spectra of both components in CuS and NiS (the latter in two crystalline modifications) and, for reason of comparison, also the fine structure of the spectra of pure metals. All measurements were carried out by means of the same instrument and with the same reference lines. The spectra were recorded in a vacuum X-ray spectrograph with quartz crystal (radius of curvature 500 mm, focusing by the Kapitza-Iogann method), with photographic recording. The sulfur spectra were produced in first-order reflection at the (10 $\bar{1}$ 1) plane, that of copper at the (1 $\bar{3}$ 40) plane of the rhombohedral crystal. The most favorable absorber thickness for recording details of fine structure was - as shown by calculations and experiments - 1-1.5 mg/cm² for sulfur, and 4-5 mg/cm² for copper. Hence, for investigating the sulfur spectrum the absorber thickness was 4 mg/cm², and for investigating that of Ni and Cu it was 6-7 mg/cm². [Abstracter's note: The authors always use the term density, the data, however, refer to the thickness of the samples]. Table 1 shows the values of wavelengths averaged from the results of 3-5 measurements. Fig. 1 shows the absorption- and emission spectra of pure copper, sulfur, and CuS. A great number of details on the shape of the spectra is discussed. Furthermore, the K β_1 line of Cu \checkmark

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was investigated by means of a microfocus spectrograph. In the copper spectrum of CuS (Fig. 2) a weak satellite line K_{β} , which occurs in the spectrum of metallic copper, is lacking. Fig. 3 shows the K-absorption edge of metallic Cu, of the γ -phase of a Cu-Zn alloy and in CuS. The authors arrive at the conclusion that CuS is an intermetallic compound in which both components impart electrons to the conduction band and remain as positive ions, as is the case in a metal. Fig. 4 shows the spectra of S and Ni in NiS, and Table 2 gives the wavelengths of the fine structures of the emission- and absorption K-spectra. The results of investigations, which are also discussed in detail, indicate that NiS belongs to the same intermetallic type as CuS. Further, it was found that the different modifications of S and Ni have different spectra with respect to their emission maxima and the position and shape of their absorption edges (Fig. 5: sulfur absorption edge in pure sulfur, in hexagonal phase (NiAs), and in millerite). CuS is superconductive, however, investigations showed that NiS should not become superconductive. Special measurements were made in the laboratory of N. Ye. Alekseyevskiy. For an additional verification of the results, investigations of the fine

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Investigation of the Fine Structure of
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structure of the K-spectra of Ni were made in superconductive NiBi
(Fig. 6). V. A. Batyrev is mentioned. There are 6 figures, 2 tables,
and 9 references: 5 Soviet, 3 American, and 1 German.

ASSOCIATION: Institut metallurgii im. A. A. Baykova Akademii nauk SSSR
(Institute of Metallurgy imeni A. A. Baykov of the Academy
of Sciences, USSR)

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83572

S/056/60/038/005/005/050
B006/B070

24.7700

AUTHORS:

Borovskiy, I. B., Kabanov, A. N., Kushnir, Yu. M.,
Shmidt, V. V.

TITLE:

The Effect of Temperature on the Characteristic Energy
Losses of Electrons in Iron

PERIODICAL:

Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1960,
Vol. 38, No. 5, pp. 1383-1387

TEXT: Borovskiy and Schmidt (Ref. 1) studied the fine structure of the main K-absorption edge of X-rays in iron and found that when the absorber is heated beyond the $\alpha \rightarrow \gamma$ transition temperature (910°C) this structure is much altered. A relation between the fine structure and the characteristic energy losses of the electrons at room temperature was also discovered by them. There are many publications dealing with the nature of the characteristic energy losses of electrons when passing through thin films of matter. Some of the models - the inelastic collisions with valence electrons, and the interaction between the charged particles and the totality of the valence electrons - are discussed in the introduction of the present paper. This interaction leads to the excitation of collective oscillations of the

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The Effect of Temperature on the Characteristic Energy Losses of Electrons in Iron S/056/60/038/005/005/050
B006/B070

electron gas (plasma oscillations). The investigations described in the present paper show that a compromise between the following two points of view may prove correct, namely, that the energy losses are due to the excitation of plasma oscillations, or that they are due to single-electron transitions between energy bands. The experimental method is described in detail. An electrostatic analyzer of the electron velocities was used, which had a resolution of 0.5 eV at an accelerating voltage of 75 keV. The samples were 0.08 - 0.10 mm thick, and the electron beam had an energy of 70 - 75 keV. The experiments were performed in vacuum ($5 \cdot 10^{-6}$ torr). The characteristic energy losses of the electrons were measured for the following temperatures of the samples: 20°C, 800°C, and 930°C. Two measurements for checking were made at 600°C. The curves taken at 20°C and 930°C (Fig.) show the energy losses (blackening of the photographic plate) as a function of the energy. The form of the curves is found to be independent of the temperature. The first characteristic loss in α -Fe (cubic, body-centered, $a = 2.86$ Å) at 20°C is (7.5 ± 0.7) eV; the following two lines at 14.8 and 21.5 eV may be considered to be multiples of the first. In γ -Fe (cubic, face-centered, $a = 3.60$ Å at 940°C) there are essential deviations. Here, the first characteristic loss is (11.6 ± 0.6) eV; the following lines at

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The Effect of Temperature on the Characteristic S/056/60/038/005/005/050
Energy Losses of Electrons in Iron B006/B070

23 and 33 ev may again be taken to be its multiples. A discussion of the results from the points of view of single-electron transitions and the excitation of plasma oscillations shows that further studies are necessary for a final clarification of this effect. The numerical data of measurement are listed in two tables. There are 1 figure, 2 tables, and 15 references: 4 Soviet, 7 US, 1 German, 1 Japanese.

ASSOCIATION: Institut metallurgii Akademii nauk SSSR
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SUBMITTED: November 4, 1959

Card 3/3

26328
S/048/61/025/008/001/009
B104/B202

24.3430 1227, 1345, 9901

AUTHORS: Borovskiy, I. B., Ditsman, S. A., Bogdanov, V. G.

TITLE: Microfocus X-ray spectrograph

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Seriya fizicheskaya, v. 25, no. 8, 1961, 919-922

TEXT: The present paper was the subject of a lecture delivered at the 5th Conference on X-ray Spectroscopy at Khar'kov, January 30 to February 4, 1961. The authors describe the construction of a new microfocus X-ray spectrograph for studying the fine structure of X-ray emission spectra. In this spectrograph a method described by Kapitza and Iogann is used for focusing the radiation with a bent crystal. The radius of curvature of the crystal is 500 mm and the instrument permits operation in a range of Bragg angles of 25-60°. When using the (1340), (1010) and (1011) faces of quartz as reflecting surfaces, the design of the instrument makes it possible to record the radiation in a range of from 1 to 7 Å. When studying the shape of the emission lines a fine adjustment of the angle of reflection from the crystal in a range of from 0.5 to 1° is possible

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Microfocus X-ray spectrograph

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with the change of the angle of reflection in this range varying from 5-6". With an angular shift of the crystal through this angle the wavelength of the reflected radiation changes by 10^{-2} X-units. The mechanical part of the spectrograph was developed according to the principle of a spectrograph designed by P. Ohlin (Dissertation, Uppsala, 1941) and G. Brogren (Nova acta Regiae soc. scient. Uppsal., IV, 14, no.4, 1 (1949)). The use of a linear shift of the crystal permitted simplification of the instrument. Fig. 1 shows the design of the instrument. The point source of radiation is arranged on the Rowland circle of the crystal. If the crystal is in position K_1 , then the reflected ray incides upon the slit of the recorder. In this position the center of the Rowland circle lies at the point O_1 . When shifting the crystal into position K_2 it is necessary, in order to maintain the position of the focus F, to shift the Rowland circle such that its center lies at the point O_2 , and the source in the position C_2 . The construction of the mechanical part of the instrument warranting proper focusing is discussed. As an example, Fig. 3 shows shapes of X-ray lines taken with the instrument described here. Fig. 4 shows two schemes of two-channel instruments. In scheme 4a the crystal is shifted along a circle, in the scheme shown in

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Microfocus X-ray spectrograph

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Fig. 45 along a straight line. In the last scheme it was possible to reduce the angle between the channels, to use smaller slits, and to simplify the entire design. There are 4 figures and 9 references: 4 Soviet-bloc and 5 non-Soviet-bloc.

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Fig. 1: Scheme of the microfocus spectrograph.

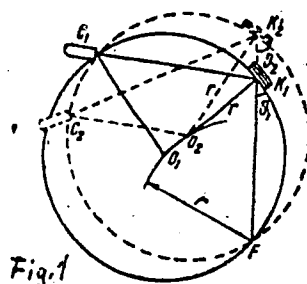


Fig. 1

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BOROVSEIY, I.B.; SHMIDT, V.V.

Effect of small admixtures of tungsten on the temperature dependence of the fine structure of the absorption K-spectrum of Fe. Izv. AN SSSR. Ser. fiz. 25 no.8:983-985 Ag '61.

(MIRA 14:8)

1. Institut metallurgii im. A.A. Baykova AN SSSR.

(Iron--Spectra)

(Tungsten)

(X-ray spectroscopy)

BOROVSKIY, I.B.; RONAMI, G.N.

Effect of thermal oscillations of atoms on the melting of
the fine structure of X-ray absorption spectra. Part 1.
Investigation of the solid solution Cu-Pt. Izv. AN SSSR.
Ser. fiz. 25 no.8:999-1001 Ag '61. (MIRA 14:8)

1. Moskovskiy gosudarstvennyy universitet im. M.V. Lomonosova.
(X rays--Spectra)
(Copper--~~Platinum~~ alloys)
(Solutions, Solid)

BOROVSKIY, I.B.

Effect of impurities on heat vibrations of metal atoms. Issl.po
zharopr.splav. 8:3-9 '62. (MIRA 16:6)

(Crystal lattices)

BOROVSKIY, I.B.; PREDVODITOV, A.A.; TYAPUNINA, N.A.; ETINA, Ye.V.

Relation between impurity distribution and dislocations in cadmium
crystals. Kristallografiia 7 no.4:600-603 J1-Ag '62.

(MIRA 15:11)

1. Moskovskiy gosudarstvennyy universitet, Moskva.
(Dislocations in crystals)

ACCESSION NR: AT3012105 S/2509/63/000/015/0003/0010

AUTHOR: Borovskiy, I. B.

TITLE: Investigations in the physics of metals

SOURCE: AN SSSR. Institut metallurgii. Trudy*, no. 15, 1963, 3-10

TOPIC TAGS: Hall effect, localized X-ray spectral analysis, coefficient of reciprocal diffusion, H, Ti, N, Cr, Zn, Cd, superconductor, Zn-Cd plating, X-ray spectral mineral analysis, spectral analysis, gas in metals

ABSTRACT: This is an introduction to a series of articles on theoretical and experimental investigations of the relationships between the physical-chemical properties of metals and alloys and their atomic-electronic structures. New and improved methods for these investigations have been developed. A method, based on the Hall effect, worked out for measuring the chargeability of atoms in alloys, was used to determine

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ACCESSION NR: AT3012105

diffusion of C in α -Fe and Ge. Diffusion studies (determination of coefficients of reciprocal diffusion in Cu-Au and Cu-Zn systems and their dependence on temperature; study of the distribution of impurities in Zn-Cd dislocations; study of composition of phases in plating), and analyses of the Pt minerals (from Al to U) of microscopic dimensions have also been conducted by localized X-ray spectral analysis. Improvements have been made in the quantitative spectral analysis of gases in metals (H in Ti, N in Ti and Cr) using spectrograph ISP-51 and UF-85 camera. Electroconductivity and optical characteristics of dilute solid solutions were investigated and theoretical explanations for non-monotonic changes in physical properties such as Young's modulus and Debye characteristic temperature were developed. The fine structure of X-ray absorption spectra of solids (superconductors and Li, Be, K, Ca, Ti, Cu, Zn) have been studied and a formula obtained for the relative absorption coefficient from which the absorption curve can be constructed and the location of maxima and minima of the fine structure can be determined. The.

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ACCESSION NR: AT3012105

theory of temperature dependence of fine structures has been worked out. Thus the potential curve for every atom in an alloy can be determined by fine structures of X-ray absorption spectra. Orig. art. has: 1 formula.

ASSOCIATION: Institut metallurgii AN SSSR (Institute of Metallurgy, AN SSSR)

SUBMITTED: 00

DATE ACQ: 29Jul63

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NO REF SOV: 000

OTHER: 000

Card 3/3

BOROVSKIY, I.B.; DITSMAN, S.A.; BOGDANOV, V.G.

New microfocal X-ray spectrograph. Trudy Inst. met. no.15:18-23
'63. (MIRA 16:9)
(X-ray spectroscopy)

BOROVSKIY, I.B.; IL'IN, N.P.; LOSEVA, L.Ye.

Investigating interdiffusion in the system Cu - Au. Trudy Inst.
met. no.15:32-40 '63. (MIRA 16:9)
(Copper-gold alloys--Metallography) (Diffusion)

BOROVSKIY, I.B.

Characteristics of the electron spectrum of superconducting
compounds. Trudy Inst. met. no.15:79-87 '63. (MIRA 16:9)
(Superconductivity) (Metal crystals—Absorption spectra)

BOROVSKIY, I.B.; TRONEVA, N.V.; RONAMI, G.N.

Investigating L_{III} X-ray spectra of tin absorption in α -Sn,
 β -Sn, and Mg_2Sn . Trudy Inst. met. no.15:88-95 '63. (MIRA 16:9)
(Tin--Absorption spectra) (X-ray spectroscopy)

ACCESSION NR: AP4002981

S/0286/63/000/018/0077/0077

AUTHOR: Borovskiy, I. B.

TITLE: A method of determining superconducting intermetallic compounds. Class 42, no. 157557

SOURCE: Byul. izobret. i tovarn. znakov, no. 18, 1963, 77

TOPIC TAGS: intermetallic compound, superconducting intermetallic compound, intermetallic compound composition, composition determination

ABSTRACT: A method of determining superconducting intermetallic compounds in various metals and their compounds, based on the application of a magnetic field. In order to achieve more rapid determination of the composition of the superconducting compound, the sample under examination, which is composed of two metals or alloys, is first subjected to a short diffusion annealing period and is then to a uniform magnetic field, the composition of the superconducting compound being determined by known methods according to the change in the magnetic lines of force.

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ACCESSION NR: AP4002981

SUBMITTED: 05Feb62

DATE ACQ: 13Dec63

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SUB CODE: IE

NO REF SOV: 000

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S/048/63/027/003/013/025
B117/B234

AUTHORS: Borovskiy, I. B., Batyrev, V. A., and Kozlenkov, A. I.

TITLE: A method of determining the asymptotic scattering phase on the basis of experimental data for the fine structure of X-ray absorption spectra

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Seriya fizicheskaya, v. 27, no. 3, 1963, 378 - 380

TEXT: A method is suggested for determining the scattering phase that agrees best with experiment when substituted in the following equation to describe the fine structure of absorption spectra:

$$\tilde{\gamma} = \sum_s A_s \sin (2kr_s + 2\eta_1) \quad (1)$$

Here r_s is the radius of the coordination sphere; A_s the amplitude of the scattered wave; η_1 the asymptotic scattering phase. To determine this phase from experimental data it is expedient to divide (1) into two added parts
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A method of determining the...

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B117/B234

$$\tilde{\epsilon} = \cos 2\gamma_1 \sum_s A \sin 2kr_s + \sin 2\gamma_1 \sum_s A_s \cos 2kr_2 \quad (2)$$

where γ_1 is the scattering phase for the K absorption spectra. The sums of $\sin 2kr_s$ and $\cos 2kr_s$ are calculated beforehand, whereupon the wave number "k" is so chosen by trial-and-error as to make the extreme values from (2) agree with those found by experiment. In calculating $\sin 2kr_s$ and $\cos 2kr_s$ it is necessary to know the number of spherical coordinate systems that have to be taken into account, which can be found by calculating those of such systems as correspond with the average fields of atoms, and by exact calculation of the A_s values. As already shown (A. I. Kozlenkov, I. v. 27, no. 3, 1963, 364) the smallest value of N_s/r_s^2 (where N_s is the number of atoms in the coordination sphere) needing to be taken into account depends on the average lattice potential. The scattering phase must be so chosen as to eliminate the uncertainty associated with cos period. This can be achieved if the scattering phase is calculated by the Wentzel-Kramers-Brillouin method from the potential read off the curve of effective Slater
Card 2/3

A method of determining the...

S/048/63/027/003/013/025

B117/B234

charge (J. C. Slater, Phys. Rev., 36, no. 1, 57 (1930)). To facilitate the choice of scattering phase it is desirable to convert the experimental curve of the absorption spectrum to the scale of the wave number:

$$E = (\hbar^2 k^2 / 2m) + A$$

where $A = U_0 - \phi$ with U_0 as the lattice potential and ϕ the work function.

It was shown that possible experimental errors may cause the errors in determination of the scattering phase to be

$$\Delta \eta_1 = -0.13 (r_1/k) \Delta E$$

(k being in \AA^{-1} , r in \AA , E in eV). The accuracy of the determination can be regarded as constant over the whole range of wave numbers and equal to 0.1 - 0.2 radians. There are 2 figures.

ASSOCIATION: Institut metallurgii im. A. A. Baykova (Institute of Metallurgy imeni A. A. Baykov)

Card 3/3

L 9872-63

EWA(h)/EWT(1)/EWT(m)/BDS--AFTTC/ASD/ESD-3--IJP(C)

ACCESSION NR: AP3001367

S/0048/63/027/006/0841/0847

AUTHOR: Borovskiy, I. B.

TITLE: Determination of microscopic characteristics of solids from investigation of the fine structure of their x-ray absorption spectra [Report of the Sixth Conference on X-Ray Spectroscopy held in Odessa from 2 to 16 July 1962]

SOURCE: AN SSSR. Izv. Seriya fizicheskaya, v. 27, no. 6, 1963, 841-847

TOPIC TAGS: x-ray spectra, fine structure, structure of solids

ABSTRACT: The paper is a review of earlier and current experimental and theoretical investigations aimed at interpretation of the fine structure of x-ray absorption spectra and relating this structure with the electronic structure of the atoms forming the solid and the symmetry and parameters of the crystal lattice of the substance. Mention is made of R. Kronig's explanation of short-wave fine structure on the basis of the band theory for metal systems and periodic variations in the density of states in crystal lattices.

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L 9872-63

ACCESSION NR: AP3001367

A. I. Kostarev's (Zhur. eksper. i teor. fiz., 39, 267, 1939) model leading to a formula for the relative absorption coefficient is described. It is noted that during the past few years there have been carried out in the authors laboratory experimental and theoretical studies aimed at clarifying what microscopic characteristics (potential fields, etc.) of metals and alloys can be deduced from observation of the fields, etc.) of metals and alloys can be deduced from observation of the fine structure in their absorption spectra. Most of the studies to date hve been concerned with the structure of the main K edges. Some of the results are briefly recounted. Some of the promising avenues for further investigations are notes: for example, study of the shape of the long wavelength satellite of the K Beta prime line which may yield information on the variation in the number of 3d electrons. Of particular interest are calculations, based on fine structure data, of the scattering phases and potential fields of atoms in alloys with distinctive properties. Orig. art. has: 7 formulas.

ASSOCIATION: Institut metallurgii im. A. A. Baykova (Institute of Metallurgy)

SUBMITTED: 00

DATE ACQ: 01Jul63

ENCL: 00

SUB CODE: 00
Card 2/2 ja/nh

NR REF SOV: 014

OTHER: 003

ACCESSION NR: AP4038779

S/0048/64/028/005/0863/0865

AUTHOR: Borovskiy, I.B.; Kupriyanova, T.A.

TITLE: Introducing corrections in plotting concentration curves for diffusion layers / Report, Seventh Conference on X-Ray Spectroscopy held in Yerevan 23 Sep-1 Oct 1963

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v.28. no.5, 1964, 863-865

TOPIC TAGS: spectral analysis, x-ray application, concentration gradient, micro-analysis, diffusion

ABSTRACT: The corrections given by A.E.Austin, N.A.Richard and C.M.Schwartz (Electron and X-Ray Microscopy, p.403,1961) for the finite size of the electron beam probe in the x-ray microanalysis of inhomogeneous materials are extended to take account of the variation of the x-ray absorption coefficient of the material along the path of the emergin x-rays. The corrections were computed for a particular x-ray spectrum microanalysis instrument employing a 5 micron diameter probe beam of 43 kV electrons for the analysis of Cu-Ni mixtures with Cu K radiation and the analysis of Co-Ni mixtures with Ni $K_{\beta 1}$ radiation. For 50% mixtures the concentration

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ACCESSION NR: AP4038779

gradient corrections amounted to 8 or 9%. The corrected calibration curves agreed within one or two percent with calibration curves obtained in one case with standard homogeneous samples, and in the other case by the method of N.P. Il'in (Izv. AN SSSR, Ser. fiz. 25, 929, 1961). The corrections considered are important not only in the case of smoothly varying concentration, as in diffusion layers, but also when inclusions are present. It is pointed out that the correction is particularly important when the difference between the absorption coefficients of the inclusion and the matrix is very great. Orig. art. has: 2 formulas and 4 figures.

ASSOCIATION: Institut metallurgii im. A. A. Baykova (Institute of Metallurgy)

SUBMITTED: 00

DATE ACQ: 12Jun64

ENCL: 00

SUB CODE: OP

NR REF SOV: 003

OTHER: 003

Card 2/2

ACCESSION NR: AP4038788

S/0048/64/0028/005/0914/0918

AUTHOR: Ronami, G.N.; Borovskiy, I.B.; Puchkova, A.K.

TITLE: Influence of temperature and minor impurities on the short wavelength fine structure in the absorption spectra of pure zinc and its alloys with silver Report, Seventh Conference on X-Ray Spectroscopy held in Yerevan 23 Sep to 1 Oct 1963⁷

SOURCE: AN SSSR: Izvestiya. Seriya fizicheskaya, v.28, no5.,1964, 914-918

TOPIC TAGS: x-ray spectrum, x-ray absorption, temperature dependence, fine structure, zinc, zinc alloy, silver alloy, fine structure melting

ABSTRACT: In order to obtain information concerning the effect of small admixtures on the temperature "melting" of the K absorption fine structure in a non-transition metal, the K absorption spectra of zinc and five zinc-silver alloys containing from 0.1 to 2.5% silver were recorded at -190, 20 and 300°C, and the zinc spectrum was also recorded at 200°C. Zinc of 99.99% purity was employed. The alloys were annealed at 250°C for 30 to 40 hours, and the 8 to 10 micron absorbing foils were vacuum annealed for two or three hours. The spectrometer employed is described elsewhere (V. A.Batyrev and V.G.Bogdanov, Izv.AN SSSR, Ser.fiz.25,933,1961). The spectra are pre-

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ACCESSION NR: AP4038788

sented graphically. The spectra of pure zinc and of the alloys containing from 1.5 to 2.5% silver were very similar. In these materials all the fine structure except the first peak nearly disappeared at 300°C. The alloys containing from 0.1 to 0.4% silver, on the other hand, still retained much of their fine structure at this temperature. The "melting" of the fine structure is presumed to be a result of the random displacements of the atoms from their equilibrium positions due to thermal motions. The mean square of these displacements is approximately proportional to T/MT_D^2 , where T is the temperature, M is the molecular weight, and T_D is the Debye temperature. It is accordingly concluded that the Debye temperature of Zn-Ag alloys containing from 0.1 to 0.4% Ag is greater than that of Zn or of alloys containing from 1 to 2.5 % Ag. The temperature dependence of the heights of the first four fine structure peaks in the zinc spectrum is compared with calculations performed by the method of V.V.Shmidt (Izv.AN SSSR.Ser.fiz.27,384,1963). The experimental and theoretical values are merely tabulated and are not discussed. Abstracter's note: The conclusion concerning the Debye temperature is supported by the data in a table in which the Debye temperatures and the temperatures of fine structure "melting" are given for Cu, Ag, Ge, Sn, Pt, Au and Pb, and the ratios of MT_D^2 for Zn:Cu, Zn:Ge, Zn:Sn, Pt:Au and Pt:Pb are compared with the corresponding ratios of the fine structure melting temperatures. Good agreement is shown for all the ratios except Pt:Pb,

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ACCESSION NR: AP4038788

and the discrepancy for this one is less than 30%. However, 1) the source of the fine structure melting temperatures is not revealed; 2) the definition of the fine structure melting temperature is not discussed, although this is not quite a trivial matter since the "melting" proceeds at different rates in different parts of the spectrum; 3) an arithmetical error was made in the calculation of the melting temperature ratio for Zn:Sn, and when this is corrected, the apparent agreement disappears; 4) the melting temperature ratios were calculated directly from the melting temperatures in degrees centigrade, which is not a reasonable procedure since the properties of water are not believed to be relevant to the phenomena discussed. When the melting temperature ratios are recalculated in terms of absolute temperature, the agreement between the Zn:Sn ratios is restored and that between the Zn:Cu and Zn:Ge ratios is improved. The agreement between the Pt:Pb ratios is destroyed entirely, and the Pt:Au ratios differ by about 23%. Moreover, the ratios for Zn:Pt (not tabulated by the authors) differ by only 14%. One can therefore say that the fine structure melting temperature is proportional to MT_D^2 for all the elements listed except Pb, within an error of about 25%. The fact that the MT_D^2 values for four of the six elements (excluding Pb) are within 10% of each other, however, considerably weakens the force of the argument. 7 Orig.art.has: 4 formulas, 6 figures and 3 tables.

Card 3/4

ACCESSION NR: AP4038788

ASSOCIATION: Fizicheskiy fakul'tet Moskovskogo gosudarstvennogo universiteta (Physics Department, Moscow State University)

SUBMITTED: 00

DATE ACQ: 12Jun64

ENCL: 00

SUB CODE: OP

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OTHER:001

Card 4/4

L 38489-66 EWP(m)/EWT(1)/EWT(m)/EWP(j) WW/JW/DJ/RM

ACC NR: AP6017838 SOURCE CODE: UR/0147/66/000/002/0130/0136

AUTHOR: Yershov, N. S.; Borovskiy, B. I.; Yakimov, V. V.

ORG: none

TITLE: Experimental investigation of the effect of the thermodynamic properties of a liquid on cavitation phenomena

SOURCE: IVUZ. Aviatsionnaya tekhnika, no. 2, 1966, 130-136

TOPIC TAGS: fluid property, thermodynamic property, cavitation

ABSTRACT: It has been proposed in previously published work that the effect of the properties of a liquid on cavitation phenomena can be evaluated in terms of the number "B", which is the ratio of the volume of vapor formed during cavitation to the volume of the liquid flow. The expression for B has the form

$$B = \frac{\gamma_{\text{v}}}{\gamma_{\text{l}}} \cdot \frac{c_{\text{v}}}{r} \cdot \frac{dp}{dt} \cdot \Delta P,$$

where dp/dt is the gradient of the change in the vapor pressure of the liquid with a change in temperature; γ is the specific weight; c is the heat capacity; r is the latent heat of vapor formation; $\text{v} = \text{liquid}$; $\text{l} = \text{vapor}$. The experiments described in the article were carried out

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UDC: 532.528

L 38489-66

ACC NR: AP6017838

in a Venturi cavitation tube. The temperature of the water was varied from 290 to 359°K, and the temperature of the alcohol from 295 to 332°K. The calculations show that, with these changes in temperature the B number changes 30 times for water and approximately 4 times for alcohol. The article includes a sketch of the cavitation tube. Orig. art. has: 9 figures. //

SUB CODE: 20/ SUBM DATE: 23Nov64/ ORIG REF: 003

Card 2/2 pb

AVACHEV, I., inzh.; BOROVSKIY, L., kand. tekhn. nauk

Thermophysical characteristics of the joints of large-panel
apartment houses with panel heating systems. Zhil. stroi.
no. 11:7-10 '65. (MIRA 18:12)

BOROVSKIIY, M.

[Ukrainian topo- and anthroponymy on the international botanical terminology] Ukrains'ke mistseve i osobove nazovnytstvo v internatsional'ni botanichnii terminologii. Vinnipeg, Nakladom Ukrains'koi vil'noi adad. nauk, 1955. 62 p. (Nazvoznaystvo, no. 9)

(MLRA 10:4)

(Names, Personal--Ukrainian) (Ukraine--Names, Geographical)
(Botany--Nomenclature)

ACC NR: AP7002735

(A)

SOURCE CODE: UR/0126/66/022/006/0849/0858

AUTHOR: Borovskiy, I. B.; Marchukova, I. D.; Ugaste, Yu. E.

ORG: Institute of Metallurgy im. A. A. Baykov (Institut metallurgii)

TITLE: Investigation of interdiffusion in binary systems forming continuous series of solid solutions, by the method of local x-ray spectral analysis. 1. Fe-Pd, Co-Pd, Ni-Pd, Cu-Pd systems

SOURCE: Fizika metallov i metallovedeniye, v. 22, no. 6, 1966, 849-858

TOPIC TAGS: x ray spectral analyzer, metal diffusion, binary alloy, palladium base alloy, iron, cobalt, nickel, copper / RSASh-2 local x-ray spectral analyzer

ABSTRACT: This is the first of a series of reports on the investigation of diffusion in the "most elementary" (binary) systems forming continuous series of solid solutions, prompted by the current state of the phenomenological and microscopic theories of diffusion. The features of interdiffusion in binary systems are characterized by the concentration dependence of the interdiffusion coefficient $D_{i,d}$. The interdiffusion process may be described with the aid of Fick's 2nd phenomenological equation

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UDC: 669.017:548.526

ACC NR: AP7002735

$$\frac{\partial c}{\partial t} = \frac{\partial}{\partial x} \left(D_{i.d.} \frac{\partial c}{\partial x} \right), \quad (1)$$

where c is the concentration of a given $D_{i.d.}$ element at point x at time instant t . Thus the problem of determining the function $D_{i.d.}(c)$ reduces to determining the concentration dependence of elements in the diffusion zone and the accuracy of calculation of $D_{i.d.}$ depends on the accuracy of plotting the curve of $c = c(x)$. It is shown that the method of local x-ray spectral analysis of chemical composition can be used to investigate interdiffusion in the systems Fe-Pd, Co-Pd, Ni-Pd, Cu-Pd over a broad range of temperatures provided that the investigator works only with the radiation of the element for which fluorescent excitation is absent in given binary system. Thus, the distribution of the concentration of investigated elements (such as Fe, Co, Ni) in the diffusion zone of vacuum-welded diffusion pairs can be analyzed according to the radiation of the lines $Fe K_{\alpha}$, $Co K_{\alpha}$, and $Ni K_{\alpha}$, respectively, with the characteristic x-ray spectrum being excited only by electron impact, in a RSASh-2 local x-ray spectrum analyzer. The resulting averaged and corrected curves of concentration are used to calculate the values of $D_{i.d.}(c)$ over the entire range of concentrations. No unambiguous correlation could be,

ACC NR: AP7002735

established between these values and the fusibility diagrams of each system. The elucidation of the concentration dependence of the "effective" mobility of atoms on the basis of various physical characteristics of the alloys in binary alloys will be the subject of subsequent investigations. Orig. art. has: 2 tables, 4 figures, 3 formulas.

SUB CODE: 11, 20/ SUBM DATE: 04Apr66/ ORIG REF: 005/ OTH REF: 019

Card 3/3

1ST AND 2ND ORDERS										3RD AND 4TH ORDERS									
COMMON ELEMENTS																			
COMMON VARIABLES INDEX																			
<p>BOROVSKIY, M. L.</p> <p>BC</p> <p style="text-align: right;">a-4</p> <p>Embryonic and postembryonic development of the cortex of the anterior central convolution in man, and the postembryonic development of the motor zone of the cortex in cats. II. M. L. Borovski (Arch. Sci. Biol., U.S.S.R., 1957, 44, No. 3, 31-40).—Examination of brains of embryos and subjects between the ages of 0 to 51 years stained for fat, fat in the walls of the blood vessels was first found in a child 16 months old and in glia and nerve cells in a child 8 years old. The amount of fat increases with age and is always found more in the deeper layers than in the superficial ones. Further details of the cytoarchitecture are given. The impregnation methods of Cajal, Golgi, and Cox were used. T. T.</p>																			
<p>ASB-31A METALLURGICAL LITERATURE CLASSIFICATION</p> <p>FROM BOMINIV</p> <p>COLLECTION</p> <p>GROUPS</p> <p>1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20</p>																			

BOROVSKIY, M.L.

New data on reinnervation of injured peripheral nerves. Vopr.
neirokhir. 16 no. 3:9-18 May-June 1952. (GLML 22:5)

1. Of the Laboratory of the Histopathology of the Nervous System
(Head -- Prof. M. L. Borovskiy), Institute of General and Experimen-
tal Pathology (Director -- Academician A. D. Speranskiy), Academy
of Medical Sciences USSR.

BOROVSKIY, M.L. [author]; SMIRNOV, L.I., chlen-korrespondent [reviewer].

"Regeneration of the nerve and trophicity." M.L.Borovskii. Reviewed by
L.I.Smirnov. Arkh.pat. 15 no.4:88-90 J1-Ag '53. (MLRA 6:11)

1. Akademiya meditsinskikh nauk SSSR (for Smirnov).
(Nerves) (Borovskii, M.L.)

Borovskiy, M.L.

USSR/General Biology.- General Histology.

B-3

Abs Jour : Ref Zhur - Biologiya, No 1, 1957, 182.

Author : M.L. Borovskiy.

Inst :

Title : Reflex Mechanisms of the Development and the Therapy of Experimental Dystrophy. Report 5. Cytological Investigations of the Formation of Nerves Under Conditions of Experimental Dystrophy.

Orig Pub : Byul, experim. biol. i meditsiny, 1955, ^{VOL. 40.} No 10, 66-69.

Abst : Experiments were conducted on 24 dogs, $1\frac{1}{2}$ to 3 years of age. The sciatic nerve was cut in the middle of the femur; 14 (1st series) and two days (2nd series) later, vitamin B₁ (correspondingly 0.00018 and 0.00006 mg/kg) was administered into the peripheral section of the cut nerve, and the ends of the nerve which were preliminarily regenerated were sewn together. In the control animals, the same was done without the administration of vitamin.

Card 1/3 (Iz Instituta patologicheskoy fiziologii i eksperimental'noy terapii (dir.--akademik A. D. Speranskiy) AMN SSSR.)

USSR/General Biology - General Histology.

B-3

Abs Jour : Ref Zhur - Biologiya, No 1, 1957, 182.

Histological investigations of the sciatic nerve, the interspinal ganglia S₂-S₄, the spinal cord at the level of S₂-S₃, and the medulla and cortex of the sigmoid type convolutions were investigated. In the first series of experiments, observations made 1½ months later of the nerves, the interspinal and sympathetic ganglia, the spinal cord, the medulla, and the cerebral cortex disclosed histological modifications more acute in the control animals than in the vitaminized animals; in some cases. these changes were not present in the latter animals at all. After a period of 6 months, this difference was even more pronounced. In the second series of experiments, observations made 1½ months later disclosed that the changes in the nerves and in the sensory ganglia in control dogs were exhibited more sharply than in the experimental animals, but 3-6 months later they were, to the contrary, weaker. The author comes to the conclusion

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USSR/General Biology - General Histology.

B-3

Abs Jour : Ref Zhur - Biologiya, No 1, 1957, 182.

that the application to the injured nerve of minimal doses of vitamin B-1 as a supplementary irritant has a favorable effect on the course of the restorative processes, if this substance is applied within a short time after the operation. The fact that the especially beneficial effect in the first group of animals may be explained by the application of a dose of the vitamin, one third of dose applied to the second group (0.00006 and 0.00018 mg) should not be overlooked.

Card 3/3

BOROVSKIY, M.L. (Moskva)

Treatment of certain diseases of the nervous sysystem by prolonged
use of weak stimuli. Zhur.nevr. i psikh. 56 no.4:328-329 '56.
(NERVOUS SYSTEM, diseases, (MLRA 9:7)
procaine clysm (Rus))
(PROCAINE, therapeutic use
nervous system dis., rectal admin. (Rus))

BOROVSKIY, M.L. (Moskva)

Present state of the theory on the trophic function of the nervous system and neural dystrophies. Zhur.nevr. i psikh. 57 no.9:1171-1178 '57.

(MIRA 10:11)

(NERVOUS SYSTEM,

trophic function & dystrophies, review (Rus))

AUTHOR:

BOROVSKIY, M. L.
~~Borovskiy, M. L.~~

20-2-59/60

TITLE:

On Certain Regularities of Morphological Changes Observed in the Organism Under Conditions of Nerve Homotransplantation
(O nekotorykh zakonomernostyakh morfologicheskikh izmeneniy, nablyudayushchikhsya v organizme v usloviyakh gomotransplantatsii nerva)

PERIODICAL:

Doklady Akademii Nauk SSSR, 1957, Vol. 114, Nr 2, pp.442-444 (USSR)

ABSTRACT:

Earlier investigations of the neuro-dystrophic processes have shown under experimental conditions two types of nerve regeneration: one adequate and one inadequate. In presence of some influences upon the organism it is possible to influence the processes of degeneration and regeneration of the damaged nerve by making these influences under certain conditions adequate, and under other conditions inadequate. Further investigations pursued the goal to study morphophysiological indices which characterize the adequacy or inadequacy not only of the regeneration of the damaged nerve but also of

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20-2-59/60

On Certain Regularities of Morphological Changes Observed in the Organism Under
Conditions of Nerve Homotransplantation

the processes taking place simultaneously in the central and peripheral nervous system as well as in the innervate tissues of the organism. The author of the present paper increased more and more the complexity of the injuries, and has now proceeded to the investigation of the above processes at an experimentally caused injury of a nerve stem and at substitution of this defect by a nerve homotransplantation. This transplantation cannot serve as "bridge", because ultimately it is resorbed and substituted by the connective tissue. The regenerated axons that have found their way to the transplantation perish. In this context, the transplantation must be either living or surviving. The hereto required conditions must be created. For this purpose, the nerve was kept in a refrigerator. The transplantation was carried out with respect to the Nervus Ischiadicus of dogs of the same sex and of the same age. The results show the following: As a rule, compensation of the disturbed limb function was more distinct in the experimental animals (with transplantation) than in the control animals (cut-out nerve segment without transplantation). In dogs which had survived seven days after the operation the adipose degeneration of the nerve bundles in

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20-2-59/60

On Certain Regularities of Morphological Changes Observed in the Organism Under Conditions of Nerve Homotransplantation

the calf muscle of the right leg was retarded as compared to the control animals. Furthermore, there existed, in the experimental dogs, in the intermediate-vertebrae ganglia, in the spinal marrow, and in the Medulla oblongata deposits of fat, and these deposits of fat were much larger in the control animals than in the experimental animals. The history of the problem under consideration shows that such operations usually fail. The instances of success never followed any pattern. It appears that we have not as yet been able to sufficiently clarify the mechanism of the influences upon the transplantation and upon the host organism which prevent a healing of the transplantation into the host body. In order to eliminate these obstacles, it would be necessary to carry out the relevant investigations in stages. In this context, certain partial steps were successfully completed, and this not only with respect to the peripheral zone - in the transplantation zone - but with regard to the entire organism, particularly in those segments

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On Certain Regularities of Morphological Changes Observed in the Organism Under Conditions of Nerve Homotransplantation

of the peripheral and central nervous system, which are more highly located. There are 4 figures (microreproductions in color), and 9 references, ~~allof~~ which are Soviet.

ASSOCIATION: Institute for Normal and Pathological Physiology, Academy of Medical Sciences of the USSR
(Institut normal'noy i patologicheskoy fiziologii Akademii meditsinskikh nauk SSSR)

PRESENTED: July 23, 1956, by A. D. Speranskiy, Member of the Academy

SUBMITTED: August 18, 1956

AVAILABLE: Library of Congress

Card 4/4

20-114-3-59/60

AUTHOR: Borovskiy, M. L.

TITLE: Variations in the Content of Ribonucleoproteins in the Nerve Cells of Organisms Under Conditions of Nerve Homotransplantation (Izmeneniya soderzhaniya ribonukleoproteidov v nervnykh kletkakh organizma v usloviyakh gomotransplantatsii nerva)

PERIODICAL: Doklady Akademii Nauk SSSR, 1957, Vol. 114, Nr 3, pp. 666-668 (USSR)

ABSTRACT: In an earlier paper the author of the paper under review reported on the results of his observations of the chronaximetry as well as of the histochemical investigations of the fat and of the glycogen in dogs, in which a homotransplantation of the nervous ischiadicus had been carried out. The paper under review discusses the results of the histochemical investigations of the ribonucleoproteids (in the following: (RNP) in the cells of the nervous system. Dogs of the same sex and of the same breed were used as test animals; always two such dogs were used for an experiment. A sector of the nervus ischiadicus was cut out under sterile conditions from the middle of the right thigh. This nerve was kept under refrigeration (at

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Variations in the Content of Ribonucleoproteins in the Nerve Cells of Organisms Under Conditions of Nerve Homotransplantation

a temperature of -3 to -2 degrees centigrade) for 72 hours. After three days the right nervus ischiadicus again was laid open, and into the gap a nerve segment of another dog was placed. For the experimental dogs, this nerve segment was previously cut into slices of a thickness of 1 - 1,5 mm, whereas it was not cut for the control animals. Following the method devised by Shabadash, the intermediate vertebrae ganglia (S_2) on both sides, the spinal marrow (S_2), the Medula oblongata and the rind of the two sigmoid coils were investigated with respect to RNP. Here are the results: In the experimental animals there existed conditions which caused a more considerable accumulation of RNP in the nerve cells than was the case in the control animals, and which therefore favored a more active regeneration of the damaged nerves. The decrease in the RNP content in the control animals probably is connected with the exhaustion of the nerve cells. This lasts for longer time and has negative effects on the processes of regeneration. If the above results are compared with results of the investigations of the trophics and of the electric irritability of the nerves in the same animals, furthermore, also

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Variations in the Content of Ribonucleoproteins in the Nerve Cells of Organisms Under Conditions of Nerve Homotransplantation

with the results of determination of glycogen and fats, we see that in the experimental animals there exists a better compensation of the pathological process than in the control animals. This compensation is expressed by the existent electric irritability in the damaged nerve, further by the less distinct trophical perturbations, and by a normal accumulation of glycogen and fats in different structural formations of the organism of the experimental dogs. There are 4 figures and 3 references, 2 of which are Soviet.

ASSOCIATION: Institute for Normal and Pathological Physiology, Academy of Medical Sciences USSR
(Institut normal'noy i patologicheskoy fiziologii Akademii meditsinskikh nauk SSSR)

PRESENTED: December 22, 1956, by A. D. Speranskiy, Member of the Academy
SUBMITTED: July 16, 1957

Card 3/3

BOROVSKIY, M. L. (Moscow)

"Structural Peculiarities and Compensation of the Trophic Functions of the Body,"

paper submitted at 8th Symposium of the Neurovegetative Research International Society, Genoa, April 9-11, 1958

Borovsky, N. F.

28(11)25(1) PHASE I BOOK EXPLOITATION SOV/2831
 Mekhanizatsiya i avtomatizatsiya trudyevskikh protsessov v litomom proizvodstve (Mechanization and Automation of Labor-consuming Processes in Foundry Practice) Moscow, Mashgiz, 1959. 226 p. 500,000 copies printed. 4,000 copies printed.

Author: N. F. Skobnikov, Candidate of Technical Sciences; Ed. (title page); G. I. Kobylanskiy (deceased); Ed. (inside book); A. B. Sokolov, Candidate of Technical Sciences; Ed.; O. V. Speranskaya; Managing Ed. for Literature on the Technology of Machinery Manufacture (Leningrad Division, Mashgiz); Ye. P. Kuzov, Engineer.

PURPOSE: The book is intended for technical personnel in foundries and engineering engaged in the mechanization and automation of industrial processes. It may also be used by students of institutions of higher technical education.

COVERAGE: The book deals with recent achievements in the mechanization and automation of time-and labor-consuming operations in foundries. Specific instances of mechanization and automation of foundry processes are described. The material presented in this book is divided into six parts, dealing with the following subjects: molding materials, mold and core making, casting, shakeout of solids, finishing of castings, and special casting methods. Each part consists of a number of technical papers presented by several authors. The application of automation techniques from the preparation of molds and cores to the mechanization and streamlining of specialized casting methods, such as investment casting and the use of shell molds. There are numerous diagrams showing automated and mechanized installations in foundries. Most of the material is based on experiments and work done at the "Krasnyy Aktyr" Plant. Some of the methods described appear to be in the experimental stage at the plant. The technical papers published in this book were originally presented at a technical conference held in the Soviet machine industry in October, 1957. No personalities are mentioned.

Yegorov, B. F. Constructions of New Molding Machines	68
Plamen, I. I. Installation for Modifying Cast Iron With Magnesium Under Pressure	113
Burilo, Ye. A. Redesign of Control Mechanisms for Electric-arc Furnaces	118
Volynskiy, V. M. Hydroblast Installation for Cleaning Castings	194
Zaslavskiy, M. Ye. Hydroblast Cleaning of Castings	162
Ginsburg, A. D. Overall Mechanization of Steel-casting Cleaning Shops	167
Dolberg, Z. A. Mechanization and Automation of Investment Casting	176
Belogorov, M. M. Recent Non-Soviet Achievements in the Automation and Mechanization of Die Casting	188
Lupreyev, I. I., N. F. Borovskiy, G. P. Nikitin, A. L. Zayata, and S. I. Ponomarenko. Mechanization of the Production of Small High-precision Castings in Pressed Shell-mold-base Shell Molds	202
Ginsburg, A. D. Semi-automatic Machine for Making Shell Molds	210

BOROVSKIY, N.V., inzh.; NOGIN, S.I., inzh.

Study of processes of crack formation in mesh-reinforced concrete.
Bet. i zhel.-bet. no.9:398-401 S '61. (MIRA 14:10)
(Precast concrete--Testing)

BOROVSKIY, N.V., kand. tekhn. nauk

Suspended ceiling of mesh-reinforced concrete panel-shells.
Prom. stroi. 42 no.5:11-13 '65. (MIRA 18:8)

BOROVSKIY, N.V., inzh.; POKRASS, L.I., inzh.

Use armored cement in road construction. Avt.dor. 25 no.9:21-23
S '62. (MIRA 15:9)

(Roads, Concrete)

BOROVSKIY, Nikolay Vladimirovich, kand. tekhn. nauk; FOKRASS,
Leonid Iosifovich, inzh.; VOLOSHCHENKO, Z.N., red.

[Mesh-reinforced concrete elements] Armatsementnye
konstruktsii. Kiev, Budivel'nyk, 1965. 130 p.
(MIRA 18:11)

ACCESSION NR: AP4013085

S/0125/64/000/002/0072/0074

AUTHOR: Panin, V. V.; Borovskiy, O. B.; Ivakhnenko, I. S.;
Iodkovskiy, S. A.

TITLE: Behavior of a drop and the liquid-puddle surface in electrosag remelting

SOURCE: Avtomaticheskaya svarka, no. 2, 1964, 72-74

TOPIC TAGS: remelting, electrosag remelting, molten metal drop, metal
puddle, welding

ABSTRACT: An experimental x-ray investigation of the processes of formation of a molten-metal drop, its motion in the slag, and the behavior of the liquid-metal puddle is reported. Type 30 and 1Kh18Ni2 steels were remelted in an aluminum single-wall crystallizer of 80-mm ID, cooled by a water drain. Flux ANF-6 was used in 10 melts, and OSTs-45, in 2 melts; electrode diameter, 30-45 mm; carbon and austenitic steels were remelted. Twin electrodes, one

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ACCESSION NR: AP4013085

current-carrying and the other nonenergized, or one consumable (steel) and the other nonconsumable (tungsten), were used to study the effect of the current on the size of the drop. Upon a fusing of the flux, discharges occur between the electrode and the starter; this is accompanied by a rapid emission of 10-15-mm drops. Details of visually observable phenomena are given, as well as two pictures of the arc. Orig. art. has: 2 figures.

ASSOCIATION: TsNIITmash (Central Scientific-Research Institute of Heavy Machine Building)

SUBMITTED: 01Feb63

DATE ACQ: 26Feb64

ENCL: 00

SUB CODE: ML

NO REF SOV: 000

OTHER: 000

Card 2/2

- [illegible]

BOLOVSKIY, P.P.

[Irkutsk Province during the past 40 years; the development of its economy. A concise, annotated bibliography] Irkutskaya oblast' za 40 let; razvitie narodnogo khoziasitva. Kratkii annotirovannyi ukazatel' literatury. Irkutsk, 1957. 33 p. (MIRA 11:4)

1. Irkutsk. Oblastnaya biblioteka.
(Bibliography--Irkutsk Province--Economic conditions)

2

Handwritten: 1
Handwritten: 2

Borovskii, P. V. On the exactness of mechanical-quadrature formulas in problems of determining displacements. Kiev, Avtomobil-Dorozh. Inst. Trudy 2 (1955), 170-175. (Russian)

This is an elementary discussion of the errors committed in applying the 3-, 4-, and 5-point Simpson-Cotes formulas to the integral $\int M_1 M_2 / EI dx$. W. E. Milne.

Handwritten: 112

Handwritten: 1